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PATENT APPLICATION

**RESPONSE AFTER FINAL REJECTION  
EXPEDITED PROCEDURE  
TECHNOLOGY CENTER ART UNIT 2652**

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APR 30 2004  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Koji SHIMAZAWA et al.

Group Art Unit: 2652

Application No.: 09/824,060

Examiner: David Donald Davis

Filed: April 3, 2001

Docket No.: 109164

For: A TUNNEL MAGNETORESISTIVE EFFECTIVE ELEMENT, AND A THIN FILM MAGNETIC HEAD, A MAGNETIC HEAD DEVICE AND A MAGNETIC DISK DRIVE DEVICE USING SAME (AS AMENDED)

REQUEST FOR RECONSIDERATION AFTER FINAL REJECTION

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**RECEIVED**

APR 30 2004

Sir:

**Technology Center 2600**

In reply to the March 10, 2004 Office Action, reconsideration is respectfully requested in view of the following remarks.

Applicants gratefully acknowledge the indication in the Office Action that claims 10 and 11 contain allowable subject matter. However, for the reasons outlined below, it is respectfully submitted that all the claims 1-17 define subject matter patentable over the references of record.

**I. The Claims Define Patentable Subject Matter**

The Office Action rejects claims 1-9 and 12-17 under 35 U.S.C. §102(b) as being anticipated by Dill (U.S. Patent No. 5,898,548). The rejection is respectfully traversed.



In particular, Dill does not disclose or suggest the magnetic bias means applying a bias magnetic field to the free layer, and at least one of the first conductive layer and the second conductive layer generating a magnetic field having the same direction as that of the bias magnetic field through a sense current therein, as recited in independent claim 1.

In the "Response to Arguments" section, the Office Action argues that Dill discloses the features of the claims because Dill discloses a tunnel magnetoresistive element as required by the claims and not unlike Applicants' invention, Dill shows current I generated magnetic field 133 in the same direction as that of bias magnetic field 151. Applicants respectfully disagree because Dill does not show current I generated magnetic field in the same direction as that of the bias field 151.

The reference numeral "133" does not designate the magnetic field generated by the sense current, but the magnetic momentum in the sense ferromagnetic layer 132. In other words, the reference numeral "133" designates the magnetic momentum in the free layer, not the direction of the magnetic field generated by the sense current. As a result, Dill is misunderstood.

With Dill, the sense current I, illustrated as the arrow in Fig. 4A, is introduced into the first spacer 102 from the first shielding layer S1, and flows perpendicularly through the antiferromagnetic layer (pinning layer) 116, the fixed ferromagnetic layer (pinned layer) 118, the tunnel barrier layer 120, the sense ferromagnetic layer (free layer) 120 and the second spacer 104, and discharges outside via the second shielding layer S2. The sense current "I", therefore, generate a magnetic field around itself, which is different from the direction of the bias ferromagnetic layer 150 (see the attached drawing).

Dill discloses at Fig. 4A and at col. 5, lines 27-31 that the sense current I flows perpendicularly through the conductive spacer layer 102, MTJ100 and the conductive space layer 104. Referring to Fig. 4A of Dill, the magnetic field generated by the sense current I will

be circular that flows into the page of Fig. 4A on the right side of the sense current I and flows out of the page of Fig. 4A on the left side of the sense current I. Therefore, the magnetic field generated by the sense current I will not in the same direction as that of the bias field 151, contrary to that asserted by the Office Action.

The following passages below are given to aid in the understanding of the claims and should not be construed as limiting the scope of the claims. As an example, referring to Fig. 2, the specification discloses that the sense current IS is flown along the line segment XY1 between the first center point P1 and the center point P0 of the ferromagnetic effective film 1. The sense current IS can be viewed as having a current component IX1 in an X-direction parallel to the bias magnetic field FX and a current component IY1 in a Y-direction perpendicular to the bias magnetic field FX. As shown at the left bottom corner of Fig. 3, the current component IY1 generates a magnetic field FX1 parallel to the bias magnetic field FX. Therefore, the bias magnetic field FX to be applied to the free layer 12 can be reinforced by the magnetic field FX1 (see also, for example, page 13, paragraph [0043]).

Nowhere does Dill disclose or suggest this feature. Therefore, Dill does not disclose or suggest at least one of the first conductive layer and the second conductive layer generating a magnetic field having the same direction as that of the bias magnetic field through a sense current therein.

Accordingly, independent claim 1 defines patentable subject matter. Claims 2-17 depend from independent claim 1, and therefore also define patentable subject matter. Accordingly, withdrawal of the rejection under 35 U.S.C. §102(b) is respectfully requested.

## II. Conclusion

In view of the foregoing amendments and remarks, this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-17 are earnestly solicited.